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(54) Title: METHODS FOR EXTRACTING TITANIUM METAL AND USEFUL ALLOYS FROM TITANIUM OXIDES

(57) Abstract: Titanium-containing metal is extracted from its oxide(s) by way of redox chemical reaction with a reducing metal. Specifically, an intimate mixture of the reducing metal and the titanium-containing oxide(s) is produced, in a preferred embodiment, by forming a metal-ceramic composite material featuring these two constituents. In a preferred embodiment, the composite body is made by infiltrating the reduced metal in molten form, into a permeable mass containing the titanium-bearing oxide(s). Concurrently or subsequent to infiltration, the redox reaction is carried out to transform the composite material, thereby forming a complex intimate mixture containing one or more oxides of the reducing metal, a titanium-containing metal, which could include an alloy of titanium with the reducing metal and/or one or more intermetallic compounds of titanium and the reducing metal, and possibly also some residual reducing metal, which itself possibly contains some titanium metal. One technique for removing the titanium-containing metal is to then comminute the transformed composite material while the metal constituent is still molten, such as by high speed shearing. The dispersed ceramic constituents can then be permitted to separate, and the metal component containing the titanium can simply be decanted.

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